CS1002 Programming Fundamentals – Fall 2022
Tutorial # 2 28-November 2022

Exercise – 1 Write the complete function prototypes for the following scenarios:

1. A function that takes Celsius as input temperature and outputs the corresponding temperature in Fahrenheit
2. A function that takes two integer arrays and places the sum of individual items of the array in a third array. It assumes that the two input arrays have the same size
3. A function that takes as input mass and speed of light and outputs the corresponding amount of energy associated with the mass.
4. A function that takes a list of values and sorts them in ascending or descending order, depending upon the input value of 'order', which is 'a' for ascending and 'd' for descending.
5. A function that takes a list of values and constructs another list of numbers, which is sorted in ascending or descending order, depending upon the input value of 'order', which is 'a' for ascending and 'd' for descending.
6. A function that takes a list of values as input and constructs another list that has positions of all items which are less 10.
7. A function that takes an employee id, a list of employees and their relevant information and returns the national id card number and age of that employee
8. A function for inputting length, color code and size of an object
9. A function for determining whether a student qualifies for a prize or not, when given his id and letter grade.
10. A function that calculates different coordinates of the trajectory of an object when given the initial velocity of the object. The total coordinates computed depend upon the initial velocity.

Exercise – 2 Write complete function implementations that performs the following tasks:

1. Takes two arguments: firstNum and secondNum (firstNum must be less than secondNum). Print all odd numbers between firstNum and secondNum.
2. Takes two arguments: firstNum and secondNum (firstNum must be less than secondNum) and returns the sum of the square of the odd numbers between firstNumand secondNum.

Dry Run the following code: counter is a global variable

A Global variable is shared among all functions

```
int counter = 0;
int function1(int x, int& y)
{
   counter = counter +5;
   x = x*100;
   y = x*10;
   return x*y;
}
int function2(int& x,int& y,int &z)
{
   counter = counter * 10;
   x = y*z;
   y = x*y;
   z = z*z;
   return x+y+z;
}
```

```
void main()
{
int x=10,y=100,z=1000;
int Result = 1;
counter++;
Result = function1(x,y);
x=1;y=2;z=3;
Result =function2(x,y,z);
}
```

Programming Exercise – 1:

Write a function that computer area and circumference of a circle using radius which should be its input parameter. Your function should work for the following main( )

```
void main( )
{
float radius, area, circum;
cin>>radius;
caclulatecircle(radius, area, circum);
cout<<area<<" "<<circum;
}
```

Programming Exercise – 2:

We need to compute roots for quadratic equation using the following formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Declare variables in main ( ) and write following functions

- **Input Function:** It should take input in a, b and c
- **Solve Function:** It should find both roots x1 and x2 using a, b and c
- **Display Function:** It should display value of the roots
- Update main( ) so that it calls all the above defined functions in correct order

Review Exercises

1. What is the output of following program?

```
int Myfunction(int a, int b)
{
    int result;
    a = a + 1;
    b = b + 1;
    result = a+b;
    return result;
}

int main()
{
    int x = 1 , y = 2;
    int count = 4;
    int sum = 0;

    while(count > 0)
    {
        y = Myfunction(count , x);
        x = x + 1;
        sum = sum + y;
        count = count - 1;
    }
    cout<<count<<endl;
    cout<<x<<endl;
    cout<<y<<endl;
    cout<<sum;

return 0;
}
```

2. What is the output of following program?

```
int subprog1(int x, int y)
{
    if(x % 2 == 0)
        y = y + 2;
    else
        y = y + 1;
  return x + y;
}

int main()
{
  int var1 = 3, b = 4;
  b = b + subprog1(var1, b);
  var1 = var1 + subprog1(var1, var1);

  cout<<var1<<endl;
  cout<<b<<endl;

  var1 = subprog1(4,3) + subprog1(b ,
2);
  cout<<var1;

 return 1;
}
```

Programming exercises

Exercise – 1

Define the following function
float **Calc_Area**(float radius)
and use it in main( )

Exercise – 2

Define a function that finds and returns largest of two integers. Test your function in main( )

Exercise – 3

Write a function that takes starting and ending numbers as input and returns sum of complete series. Test your function in main( )

Exercise – 4

Using predefined functions, calculate the value of following expression by taking input in a,b,c variables

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$